THE

# AMERICAN

# JOURNAL OF SCIENCE.

**Established by BENJAMIN SILLIMAN in 1818.**

EDITORS

JAMES D. AND EDWARD S. DANA.

ASSOCIATE EDITORS

PROFESSORS JOSIAH P. COOKE, GEORGE L. GOODALE AND JOHN TROWBRIDGE, OF CAMBRIDGE.

PROFESSORS H. A. NEWTON AND A. E. VERRILL, OF NEW HAVEN,

PROFESSOR GEORGE F. BARKER, OF PHILADELPHIA.

---

**THIRD SERIES.**

VOL. XLIII.—[WHOLE NUMBER, CXLIII.]

**Nos. 253—258.**

JANUARY TO JUNE, 1892.

WITH XVII PLATES.

PUBLIC LIBRARY,
OCT 26 1892
DETROIT, MICH.

NEW HAVEN, CONN.: J. D. & E. S. DANA.

1892.

Tuttle, Morehouse & Taylor, Printers, 371 State St., New Haven, Conn.

# CONTENTS OF VOLUME XLIII.

## Number 253.


Page

ART. I.—Theory of an Interglacial Submergence in England; by G. FREDERICK WRIGHT ..... 1

II.—Permian of Texas; by RALPH S. TARR ..... 9

III.—Chemical Composition of Iolite; by O. C. FARRINGTON 13

IV.—Series of Caesium Trihalides; by H. L. WELLS; including their Crystallography; by S. L. PENFIELD .... 17

V.—Law of Elastic Lengthening; by J. O. THOMPSON ..... 32

VI.—Method for the Quantitative Separation of Strontium from Calcium by the Action of Amyl Alcohol on the Nitrates; by P. E. BROWNING ..... 50

VII.—Relation of Melting Point to Pressure in Case of Igneous rock fusion; by C. BARUS ..... 56

VIII.—Discovery of Clymenia in the Fauna of the Intumescens-zone (Naples beds) of Western New York, and its Geological Significance; by JOHN M. CLARKE ..... 57

IX.—New Meteoric Iron from Garrett Co., Maryland; by A. E. FOOTE. With Plate I. ..... 64

X.—Farmington, Washington Co., Kansas Aerolite; by G. F. KUNZ and E. WEINSCHENK ..... 65

XI.—APPENDIX—Skull of Torosaurus; by O. C. MARSH. With Plates II and III ..... 81


SCIENTIFIC INTELLIGENCE.


*Chemistry and Physics*—On Isomorphism, RETGERS, 68.—Crystallized Persulphates, MARSHALL, 69.—Preservation of Sodium, ROSENFELD: New Oxygen Compounds of Molydenum and of Tungsten, PÉCHARD, 70.

*Geology and Mineralogy*—Bibliography undertaken by the International Congress of Geologists, 71.—Experimental researches, etc., A. DAUBRÉE, 73.—Classification of Mountain Ranges according to their Structure, Origin and Age, W. UPHAM, 74.—Geology of Quebec City, Canada, H. M. AMI, 75.—Geological and Natural History Survey of Canada: Notes on Brazilian Mineralogy, E. HUSSAK, 77.—Estimation of the Optical Angle, A. C. LANE: Systematic Mineralogy based upon a Natural Classification, T. S. HUNT: The Phosphates of America, F. WYATT, 79.—Kiowa Co. (Kansas) Meteorite, R. HAY: Geological Survey of Kentucky, John R. Procter, Director, G. M. SULLIVAN, 80.

*Obituary*—HENRY NOTTIDGE MOSELY: PHILIP HERBERT CARPENTER, 80.

## Number 254.

Page

ART. XII.—Use of a Free Pendulum as a Time Standard; by T. C. MENDENHALL ..... 85

XIII.—Bear River Formation, a Series of Strata hitherto known as the Bear River Laramie; by C. A. WHITE ... 91

XIV.—Stratigraphic Position of the Bear River Formation; by T. W. STANTON ..... 98

XV.—Iron Ores of the Marquette District of Michigan; by C. R. VAN HISE ..... 116

XVI.—Illustration of the Flexibility of Limestone; by A. WINSLOW ..... 133

XVII.—Separation of Iron, Manganese and Calcium by the Acetate and Bromine Methods; by R. B. RIGGS ..... 135

XVIII.—Central Massachusetts Moraine; by R. S. TARR .. 141

XIX.—Proofs that the Holyoke and Deerfield Trap Sheets are Contemporaneous Flows and not later intrusions; by B. K. EMERSON ..... 146

SCIENTIFIC INTELLIGENCE.

*Chemistry and Physics*—On the Gravi-volumeter, JAPP: The element Fluorine, MOISSAN, 149.—Commercial production of Ozone, FRÖLICH, 150.—Free Hydroxylamine. LOBRY DEBRUYN: Iron Carbonyls, MOND and LÄNGER, 151.—Presence of Iron-Carbonyl in Water Gas, ROSCOE and SCUDDER: An Introduction to Chemical Theory. A. SCOTT, 152.—Experiments arranged for Students in General Chemistry, E. F. SMITH and H. F. KELLER: Text-book of Elementary Chemistry, G. F. BARKER: Low Temperatures, PICTET, 153 —Vibrations of Strings, MENZEL and RAPS, 154.—The Telephone as an optical instrument for current measure, M. WIEN: Solubility of Glass, F. KOHLRAUSCH: Introduction to the Mathematical Theory of Electricity and Magnetism, W. T. A. EMTAGE, 155.

*Geology and Mineralogy*—Tenth Annual Report of the U. S. Geological Survey, 1888–89, J. W. POWELL, Director, 155.—Stratigraphy of the Bituminous Coal Field of Pennsylvania, Ohio and West Virginia, I. C. WHITE, 156.—Age of the Plants of the American Trias, L. F. WARD: Chalk and flints at the Solomon Islands, LIVERSIDGE, 157.—Paramelaconite and Footeite, G. A. KOENIG: Notes on the Genus Acidaspis, etc., J. M. CLARKE, 158.—Cretaceous fossils of Syria: Igneous Rocks of Arkansas, J. F. WILLIAMS, 159.

*Botany and Zoology*—Specific Assimilation in Umbelliferæ, DE LAMARLIÈRE, 160. —Effects of poisons on the germination of seeds, CH. CORNEVIN: Proofs of land-communication between Europe and America during the "modern" age of the earth, E. BLANCHARD: Comparative Anatomy of Plants. AD. CHATIN, 161. —Experiments on Root-grafting, L. DANIEL: Physiological notes: Die natürlichen Pflanzenfamilien, ENGLER and PRANTL: Work of the Lobworms in bringing Sand to the Surface, C. DAVISON, 162.

*Astronomy and Terrestrial Physics*—Periodic Variation of Latitude, 163.—Astronomy and Astro-Physics, 166.

*Miscellaneous Scientific Intelligence*—Essays upon Heredity and kindred Biological Problems, A. WEISSMANN: Ostwald's Klassiker der exakten Wissenschaften: Minerals, A monthly magazine, 166.—Modern American Methods of Copper Smelting, E. D. PETERS, Jr., 167.

*Obituary*—Dr. JOSEPH LOVERING: WILLIAM P. RUST, 167.—SIR ANDREW CROMBIE RAMSAY: Dr. FERDINAND VON RŒMER, 168.

## Number 255.

Page

ART. XX.—Mt. St. Elias and its Glaciers; by I. C. RUSSELL. With a map, Plate IV ..... 169

XXI.—Hudson River "Fiord"; by A. M. EDWARDS..... 182

XXII.—Contributions to Mineralogy, No. 52; by F. A. GENTH. With Crystallographic Notes; by S. L. PENFIELD ..... 184

XXIII.—Tschermak's Theory of the Chlorite Group and its Alternative; by F. W. CLARKE ..... 190

XXIV.—Recent Fossils near Boston; by W. UPHAM..... 201

XXV.—The Highest Old Shore Line on Mackinac Island; by F. B. TAYLOR..... 210

XXVI.—Nature of Colloid Solutions; by C. E. LINEBARGER 218

XXVII.—Observations upon the Structural Relations of the Upper Huronian, Lower Huronian and Basement Complex on the North Shore of Lake Huron; by R. PUMPELLY and C. R. VAN HISE ..... 224

XXVIII.—A Phasemeter; by J. TROWBRIDGE..... 232

XXIX.—Preliminary Report of Observations at the Deep Well, Wheeling, West Virginia; by W. HALLOCK .... 234

XXX.—Mount Bob, Mount Ida, or Snake Hill; by T. W. HARRIS ..... 236

APPENDIX.—XXXI.—Discovery of Cretaceous Mammalia, Part III; by O. C. MARSH. With Plates V–XI .. ... 249

### SCIENTIFIC INTELLIGENCE.

*Physics and Astronomy*—Variation in the Density of Water with the Temperature, D. MENDELÉEFF: New Method of obtaining a Constant Temperature, H. CLEW: Velocity of Sound in membranous bodies, L. MELDE: A Surface Bolometer, Dr. KURLBAUM: Orthochromatic Photography, MM. FABRE and ANDOYER, 239.—Prize for Researches in Physics: Astronomical Expeditions to Peru, 240.—Causes of the Phenomena of Terrestrial Magnetism, H. WILDE, 241.—Astronomical Handbook for the year 1892, 242.

*Geology and Mineralogy*—Honor to the United States Geological Survey from the French Academy of Sciences, 242.—Geology of the Tonga or Friendly Islands, J. J. LISTER, 243.—Notes on the Palæozoic Species mentioned in Lindley and Hutton's "Fossil Flora," R. KIDSTON: Correlation Papers, Cambrian, C. D. WALCOTT: Index to the known Fossil Insects of the World, including Myriapods and Arachnids, S. H. SCUDDER, 244.—Removal of gold from suspension and solution by Fungoid growths, A. LIVERSIDGE: Les Méthodes de Synthèse en Minéralogie, S. MEUNIER, 245.—Brief notices of some recently described minerals, 246.

*Obituary*—THOMAS STERRY HUNT, 246.—SIR GEORGE BIDDELL AIRY: JOHN COUCH ADAMS, 248.

## Number 256.

Page

ART. XXXII.—Action of Vacuum Discharge Streamers upon each other; by M. I. PUPIN. With Plate XII ... 263

XXXIII.—Melilite-bearing Rock (Alnoite) from Ste. Anne de Bellevue near Montreal, Canada; by F. D. ADAMS.. 269

XXXIV.—Azure-blue Pyroxenic Rock from the Middle Gila, New Mexico; by G. P. MERRILL and R. L. PACKARD ... 279

XXXV.—Correlation of Moraines with Raised Beaches of Lake Erie; by F. LEVERETT ... 281

XXXVI.—Magnesium as a Source of Light; by F. J. ROGERS ... 301

XXXVII.—Method for the quantitative separation of Barium from Calcium by the action of Amyl Alcohol on the Nitrates; by P. E. BROWNING ... 314

XXXVIII.—Plicated Cleavage-Foliation; by T. N. DALE.. 317

XXXIX.—Geological Age of the Saganaga Syenite; by A. R. C. SELWYN ... 319

XL.—Third Occurrence of Peridotite in Central New York; by C. H. SMYTH, JR. ... 322

XLI.—Fulgurite from Waterville, Me.; by W. S. BAYLEY.. 327

XLII.—Mineralogical Notes on Brookite, Octahedrite, Quartz and Ruby; by G. F. KUNZ ... 329

APPENDIX.—XLIII.—Recent Polydactyle Horses; by O. C. MARSH ... 339

### SCIENTIFIC INTELLIGENCE.

*Chemistry and Physics*—Existence of Suspended Matter in Flames, STOKES: Use of Surface Tension in Analysis, GOSSART, 331.—Certain Metallic Hydrosulphides, LINDER and PICTON: Physical Constitutions of certain Sulphide Solutions, PICTON, 332.—Solution and Pseudo-solution, PICTON and LINDER, 333.—Methods of Gas Analysis, W. HEMPEL, 334.—Leçons sur les Metaux, A. DITTE: Solutions, W. OSTWALD, 335.

*Geology and Natural History*—Ueber Tertiärpflanzen von Chile, ENGELHARDT, 335.—Miocene Plants from Northern Bohemia, ENGELHARDT, 336.—Calcareous Algæ, ROTHPLETZ: Fructification of Bennettites Gibsonianus, GRAF ZU SOLMS-LAUBACH: Nelumbium Provinciale des Lignites Crétacés de Fuveau en Provence, G. DE SAPORTA, 337.—Recherches sur la Végétation du niveau Aquitanien de Manosque, G. DE SAPORTA: Fauna of British India, including Ceylon and Burma, W. T. BLANFORD: Inheritance of Acquired Characters, D. G. ELLIOT, 338.

*Obituary*—SERENO WATSON, 338.

## Number 257.

Page

ART. XLIV.—Radiation of Atmospheric Air; by C. C. HUTCHINS ..... 357

XLV.—Atmospheric radiation of Heat and its Importance in Meteorology; by C. ABBE ..... 364

XLVI.—Experiments upon the Constitution of certain Micas and Chlorites; by F. W. CLARKE and E. A. SCHNEIDER 378

XLVII.—Qualitative Separation and Detection of Strontium and Calcium by the Action of Amyl Alcohol on the Nitrates; by P. E. BROWNING ..... 386

XLVIII.—The Age and Origin of the Lafayette Formation; by E. W. HILGARD ..... 389

XLIX.—Influence of Swamp Waters in the Formation of the Phosphate Nodules of South Carolina; by C. L. REESE 402

L.—Plattnerite, and its Occurrence near Mullan, Idaho; by W. S. YEATES; with Crystallographic Notes, by E. F. AYRES ..... 407

LI.—Upper Silurian Strata near Penobscot Bay, Maine; by W. W. DODGE and C. E. BEECHER. With Map ..... 412

LII.—Zinc-bearing Spring Waters from Missouri; by W. F. HILLEBRAND ..... 418

LIII.—A Meteorite from Pennsylvania; by W. G. OWENS. 423

LIV.—Two Meteoric Irons; by G. F. KUNZ and E. WEINSCHENK. With Plate XIII ..... 424

LV.—The Molecular Masses of Dextrine and Gum Arabic as determined by their Osmotic Pressures; by C. E. LINEBARGER ..... 426

APPENDIX.—LVI.—A New Order of Extinct Eocene Mammals (*Mesodactyla*); by O. C. MARSH ..... 445

LVII.—Notice of New Reptiles from the Laramie Formation; by O. C. MARSH ..... 449

### SCIENTIFIC INTELLIGENCE.

*Chemistry and Physics.*—Physical Properties of Fluorine, MOISSAN, 429.—Expansion of Chlorine in Violet Light, RICHARDSON: Dissociation of liquid Nitrogen peroxide, OSTWALD, 430.—New method of preparing Carbonyl sulphide, NURICSÁN: Preparation and Properties of Cæsium, BEKETOFF: Color of Cobalt-Solutions, ÉTARD, 431.—Method of showing Electrical Waves, LECHER: Permanent Magnetic Field, W. HIBBERT: Dielectric Constant and Conductivity, M. E. BOUTY: Aberration, RAYLEIGH, 432.—Kirchhoff's Law and the radiation of Gases, E. PRINGSHEIM, 433.

*Geology and Natural History.*—Note on distribution of upturned Cretaceous beds of Brit. America, G. M. DAWSON, 433.—Preliminary Report on the Coal-deposits of Missouri, A. WINSLOW: Baltimore, with an account of the Geology of its environs, WILLIAMS, 435.—Annuaire Géologique, L. CAREZ et H. DOUVILLÉ: Supplementary Appendix to Travels amongst the Great Andes of the Equator, E. WHYMPER: Concerning principles which accompany chlorophyll in leaves, ÉTARD: Structure of the ovule and the development of the embryo-sac in Vincetoxicum, CHAUVEAUD, 436.—Researches regarding the effect of leaf-removal in the case of grape-vines, A. MUNTZ: The Italian Botanical Society, 437.

*Miscellaneous Scientific Intelligence.*—Latitude Observations at Waikiki, on the island of Oahu, Hawaiian Islands, 438.—National Academy of Sciences, 441.

*Obituary.*—SERENO WATSON, 441.

## Number 258.

Page

ART. LVIII.—Subdivisions in Archæan History; by J. D. DANA ..... 455

LIX.—Electrical Discharges through poor Vacua, and on Coronoidal Discharges; by M. I. PUPIN. With Plate XIV ..... 463

LX.—Rubidium and Potassium Trihalides; by H. L. WELLS and H. L. WHEELER. With their Crystallography; by S. L. PENFIELD ..... 475

LXI.—Clinton Iron Ore; by C. H. SMYTH, JR. ..... 487

LXII.—Wilde's Explication of the Secular Variation Phenomenon of Terrestrial Magnetism; by L. A. BAUER .. 496

LXIII.—Josephinite, a new Nickel-Iron; by W. H. MELVILLE ..... 509

LXIV.—Fibrous Intergrowth of Augite and Plagioclase, resembling a reaction rim, in a Minnesota Gabbro; by W. S. BAYLEY ..... 515

LXV.—Method for the Determination of Barium in the presence of Calcium and Magnesium; by F. W. MAR ..... 521

LXVI.—Note on the Absorption of Radiant Heat by Alum; by C. C. HUTCHINS ..... 526

LXVII.—Disruption of the Silver Haloid Molecule by Mechanical Force; by M. CAREY LEA ..... 527

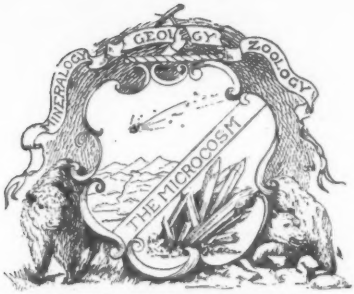
APPENDIX.—LXVIII.—Notes on Triassic Dinosauria; by O. C. MARSH. With Plates XV, XVI, and XVII ..... 543

### SCIENTIFIC INTELLIGENCE.

*Chemistry and Physics.*—Polarization of Platinum by Oxygen and Hydrogen, MARKOFSKY, 531.—Basicity of Phosphoric Acid, D. BERTHELOT, 532.—Occlusion of Hydrogen by Lead and other metals, NEWMANN and STREINTZ: Principles of Chemistry, D. MENDELÉEFF, 533.—Manual of Chemical Technology, by Rudolf von Wagner, W. CROOKES and F. FISCHER: Laboratory of Chemistry, J. E. ARMSTRONG and J. H. NORTON, 535.—Untersuchungen über die Ausbreitung der elektrischen Kraft, H. HERTZ, 335.—Vorlesugen über Maxwell's Theorie der Elektricität und des Lichtes, L. BOLTZMANN, 536.

*Geology and Natural History.*—A Summary Description of the Geology of Pennsylvania, J. P. LESLEY, 536.—Fossil Botany, H. GRAF ZU SOLMS-LAUBACH and H. E. F. GARNSEY and I. BAYLEY, 537.—Ueber einige carbone Pflanzenreste aus der Argentinischen Republik, L. SZAJNOCHA: Cambrian of Sardinia, J. G. BORNEMANN, 538.—Fossils in the St. Peter's Sandstone, F. W. SANDESON: Correlation Papers, W. B. CLARK: Glacier Rock-crushing, W. G. TIGHT: System of Mineralogy of J. D. Dana, E. S. DANA, 539.—Supposed occurrence of Platinum in North Carolina, F. P. VENABLE: Summary of Progress in Mineralogy and Petrography, W. S. BAYLEY: Gay-lussite from San Bernardino Co., Cal., H. G. HANKS, 540.

*Miscellaneous Scientific Intelligence.*—Report of the Smithsonian Institution for 1890, 540.—Boston Society of Natural History: Proceedings of the Colorado Scientific Society, 541.—Volcano of Kilauea, Hawaii: Physiography, J. SPENCER: Universal English-German and German-English Dictionary, F. FLÜGEL: The Ward Collection of Meteorites, 542.




**EDWIN E. HOWELL, Proprietor.**

## *RELIEF MAPS AND MODELS.*

Especial attention given to Relief Maps. All work of this kind executed accurately and artistically. Also copies furnished of models made for the government; Grand Cañon of the Colorado. Yosemite Valley, Wasatch and Uinta Mountains, Mt. Taylor, Mt. Shasta, Leadville, Eureka, Yellowstone National Park, etc., etc Also model of the whole **United States** with adjoining *Ocean bottoms, modeled on correct curvature.*

## *SYSTEMATIC COLLECTIONS.*

With unusual facilities for securing educational materials it is proposed to lead all establishments in furnishing systematic collections for teaching **Mineralogy, Geology,** and **Zoology** in Schools and Colleges. Individual specimens also furnished.

## *METEORITES.*

Write me if you have meteorites to sell, or wish to buy, or have them cut and polished.

**ANATOMICAL MODELS, TAXIDERMY, Etc.**

**EDWIN E. HOWELL,**

**537, 15th St. and 612, 17th St., N. W., Washington, D. C.**

---

# BECKER BROTHERS,

**No. 6 Murray Street, New York,**

Manufacturers of Balances and Weights of Precision for Chemists, Assayers, Jewelers, Druggists, and in general for every use where accuracy is required.

---

## AMERICAN JOURNAL OF SCIENCE.

FOUNDED BY PROFESSOR SILLIMAN IN 1818.

Devoted to Chemistry, Physics, Geology, Physical Geography, Mineralogy, Natural History, Astronomy, and Meteorology.

EDITORS: JAMES D. DANA and EDWARD S. DANA.

*Associate Editors:* J. P. COOKE, JR., GEORGE L. GOODALE, and JOHN TROWBRIDGE, of Cambridge, H. A. NEWTON and A. E. VERRILL, of Yale, and G. F. BARKER, of the University of Pennsylvania, Philadelphia.

Two volumes of 480 pages each, published annually in **MONTHLY NUMBERS.**

This Journal ended its *first* series of 50 volumes as a quarterly in 1845, and its *second* series of 50 volumes as a two-monthly in 1870. The monthly series commenced in 1871.

Twenty copies of each original communication are, *if requested in advance*, struck off for the author without charge; and more at the author's expense, provided the number of copies desired is stated on the manuscript or communicated to the printers of the Journal.

Address the PROPRIETORS,

**J. D. and E. S. DANA, New Haven, Conn.**